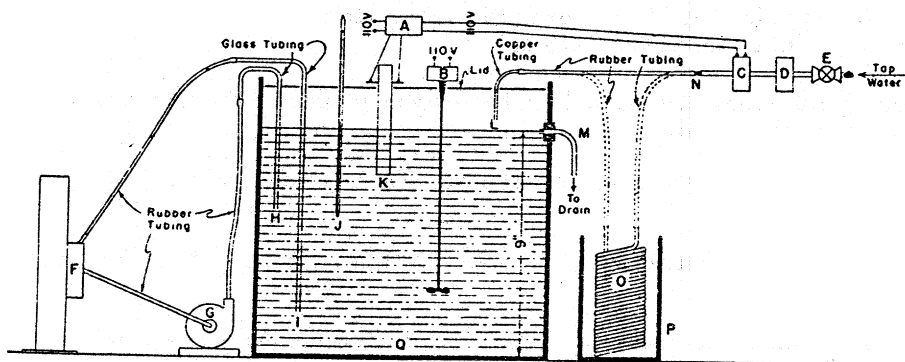


Constant-Temperature Bath for Use at About 20° C.

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The readily assembled constant-temperature bath represented in Figure 1 has been used satisfactorily for some time in this Laboratory to maintain the temperature of the prisms of an Abbé refractometer at 20° C. This bath, which can be operated from about 15° to 25° C., appears to be simpler and more convenient in construction and operation than those previously described (1, 2, 3, 4).

Cold tap water at service pressure is used to maintain the bath (an insulated 4½-gallon glass jar) at several degrees below room temperature. The cold water is added directly, at L, to the bath which is kept well agitated by



CONSTANT TEMPERATURE BATH

- | | | |
|-------------------------------|--------------------------------|---|
| A • Relay | G • Small centrifugal pump | M • Constant level outlet |
| B • Stirrer | H • 20°C water outlet | N • Serrated hose connection |
| C • Solenoid valve | I • 20°C water return | O • Copper coil (40 ft. $\frac{1}{4}$ tubing) |
| D • Strainer | J • Thermometer | P • Container (plain or vacuum-jacketed) |
| E • Tap water valve | K • Thermoregulator (shielded) | Q • Pyrex jar (insulated) |
| F • Refractometer prism cases | L • Cooling water inlet | |

Fig. 1.

stirrer B. Tap water is cold enough to serve as coolant for about 7 months of the year in the Philadelphia area. During the other 5 months the water is passed through a coil of copper tubing immersed in ice water (O, P) and connected into the line between N and L. The copper coil will be kept cool for about 8 hours in a 3-gallon vacuum-jacketed container packed with chipped ice. An ordinary container such as a pail will require more frequent use of ice.

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The flow of water is controlled by solenoid valve *C*, which is operated by an electronic relay *A*. Thermoregulator *K* is set for 20° C. and is connected to relay *A* so that, if the thermoregulator circuit is open (bath at 20° C. or below), the relay circuit is also open and no water flows. If the temperature of the bath becomes greater than 20° C., the thermoregulator circuit is closed and this in turn closes the relay circuit. The solenoid valve is then actuated and allows cold water to flow into the bath until the temperature falls to 20° C.

Standard plumbing connections hold parts *E*, *D*, *C* and *N* in place. Holes drilled through a galvanized metal lid covering a portion of the jar are used to support parts *H*, *I*, *J*, *K* and *L* in place. Stirrer *B* is supported over the uncovered portion of the bath. Container *Q* is a standard Pyrex heavy-wall glass jar 12" high and 12" in diameter (4½ gallon size). This jar may be given a heavy coat of asbestos insulation by covering it with wet fire felt (one or two layers) and then drying in a large oven at 100° C.

The temperature of the bath can be adjusted to 20° C. in about 10 minutes at the beginning of the day. Relatively small amounts of water are required to keep the temperature at $20 \pm 0.02^\circ \text{C}$. during the day, even when the bath water is pumped through an Abbé refractometer, as shown in Figure 1. The water level is maintained at *M* (hole drilled in side of jar to hold No. 6 rubber stopper, in turn drilled for 10-mm. tubing).

The temperature control indicated can be easily maintained if the following or equal equipment is used:

- K*, Thermoregulator: American Instrument Co., Silver Spring, Md., Cat. 41, No. 4-201.
- C*, Solenoid Valve: American Instrument Co., Silver Spring, Md., Cat. 41, No. 4-609E.
- D*, Strainer: American Instrument Co., Silver Spring, Md., Cat. 41, No. 4-6093.
- A*, Electronic Switch (Relay): United Cinephone Corp., Torrington, Conn., Model ES-15M3.
- P*, Vacuum-Jacketed Container: Vacuum Can Co., Chicago, Ill., Aervoid No. 400BC.
- Asbestos Fire Felt: Johns-Manville Sales Corp., New York, N. Y.

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